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OBESITY IN CHILDREN AND TYPE 2 DIABETICS' LIPID PROFILES

Anam Aziz JASIM [1]
Middle Technical University, Iraq

Taghreed Khudhur MOHAMMED[2]
Middle Technical University, Iraq

Alaa Abdulkhaliq JABBAR[3]
Middle Technical University, Iraq

Abstract

Background: in general, obesity is defined as an excessive buildup of a person's body fat. The Body mass index -BMI is calculated by dividing a person's weight in kilograms by the square of his height in meters. It's a simple test that's more frequently used to diagnose adult obesity and overweight. The BMI percentiles for age and gender are used since the quantity of body fat in children is distinct from that in adults due to variations in age and sex. Obesity in children is a major public health concern worldwide, particularly in the developed world, but it is also on the increase in developing countries.
Objective: To determine the incidence of childhood obesity and potential risk factors among children aged 6 to 12 in Baghdad's primary schools.
Methods: eighty children (38 boys and 42 girls), aged from 6 to 9 years were suffered from obesity and type II diabetes were chosen in the current study. Venous blood samples were collected from children during the period from January 1 to December 25, 2020. White blood cell count (WBCs); PCV; platelets; Triglyceride; cholesterol; LDL; HDL; and blood sugar were measured. The weight and height of each child were also measured.
Results: The highest incidence of obesity was among the 9-year-old boys who were 126-128 centimeters (cm) in length and weighed 34-35 kg, and the BMI for this age group was 21.4% kg/m² and the percentile range was 96%, this means that children suffer from overweight. Nine-year-old girls also recorded the highest range of BMI, as it was 22-23.2 kg/m² and percentile range 99%-102%, which means that they suffer from overweight as is the case with boys, there were no significant differences between boys and girls with regard to BMI, as all of them suffer from obesity. The results showed that most of the children had less than normal platelet count and packed cell volume, whereas the proportions of triglycerides, LDL and HDL were high. All the children in the current study were eating multiple meals (more than 5 meals per day) rich in fats and sweets, sedentary and inactive, tired quickly, their comprehension is slow in the study, and they do not go to school on foot, but ride in one of the parents' cars, which reduces the speed of burning fat and the appearance of obesity in them.

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[1] naomaaziz@gmail.com, https://orcid.org/0000-0002-8561-7581
[2] taghreidkheder@gmail.com, https://orcid.org/0000-0002-2521-6946
[3] alaaabdalkhaleq@yahoo.com, https://orcid.org/0000-0002-0612-3787

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Conclusion: According to this study, obesity and overweight have several causes. According to the study, sedentary activity and the consumption of unhealthy foods are all risk factors. Obesity and diabetes may result as a result of this.

Keywords: Obesity, Children, Diabetes.

Introduction

Obesity in children and teenagers is a significant medical issue. It is particularly worrisome because excess weight often puts children on the path to health problems that were previously considered problems of adults, such as diabetes, hypertension, and excessive cholesterol. Obesity in children can lead to a variety of complications like low self-esteem and depression [1].

There are several factors that can increase the risk of weight gain in children, the most important of which are consuming foods rich in calories, such as fast food, sweets and fruit juices; lack of exercise; spending too much time in front of the TV and video games. Some children eat excessively to overcome psychological problems, to process emotions such as stress, or to combat boredom. Obesity susceptibility in children is influenced by genetic factors also. Certain medications, such as neurontin and Gralise; in addition to indiscriminate use of appetite suppressants can increase the risk of obesity [2, 3]. Obesity in children can lead to a variety of physical problems which may include: Type I and II diabetes, joint pain problems, breathing problems, high cholesterol and high blood pressure, causing narrow and hardened arteries, and potentially leading to heart attacks or strokes later in life [4].

Children who are overweight have a higher chance of developing insulin resistance. High blood sugar causes a variety of potentially significant health issues as the body fights to control insulin [5]. The objectives of this study are to determine the extent of weight gain and obesity and its relationship to some blood parameters among children with type II diabetes aged 6-50 months in the Obesity treatment and research unit/ Al-Kindi College of Medicine/University of Baghdad.

Materials and methods

Patients and Data Collection: eighty children (38 boys and 42 girls), aged from 6 to 9 years were suffered from obesity and type II diabetes were chosen in the current study. Venous blood samples were taken from children between the 1st of January and the 25th of December, 2020. All children were admitted to the Obesity treatment and research unit/ Al-Kindi College of Medicine/University of Baghdad. All children in the current study were eating multiple meals (more than 5 meals per day) rich in fats and sweets, sedentary and inactive, tired quickly, their comprehension is slow in the study, and they do not go to school on foot, but ride in one of the parents' cars, which reduces the speed of burning fat and the appearance of obesity in them.

A handheld stadiometer was used to measure height without shoes to the closest 0.1 cm. A well-calibrated digital scale was used to measure weight in light clothes to the closest 0.1 kg. The ratio of weight (kg) to height (m) squared (kg/m^2) was used to determine BMI [6].

Laboratory tests: blood serum triglycerides concentration (Biosystems S.A., Barcelona, Spain); serum LDL cholesterol levels (Biosystems S.A., Barcelona, Spain); serum HDL cholesterol levels (Biosystems S.A., Barcelona, Spain); glucose levels in the blood (Biosystems S.A., Barcelona, Spain); total white blood cells (WBCs), packed cell volume (PCV) and platelets [7] were estimated.

Statistical Analysis: The data was examined using the statistical program (SPSS), and p-values were considered significant when they were less than 0.05.

Results and discussion:

This study included 80 children with obesity and type 2 diabetes; 44 (55%) of children were boys and 36 (45%) were girls [Table 1]. All of the children in the current study ate multiple meals (more than 5 meals per day) that were high in fats and sugars; they were sedentary and inactive, tired easily, their comprehension was slow in the study, and they did not walk to school but rode in one of their parents' cars, which slowed their fat burning and made them appear obese.

The highest incidence of obesity was among the 9-year-old boys who were 126-128 centimeters (cm) in length and weighed 34-35 kg, and the BMI for this age group was 21.4% kg/m^2 and the percentile range was 96%, this means that children suffer from overweight [Table 2, 3]. Nine-year-old girls also recorded the highest range of BMI, as it was 22-23.2 kg/m^2 and percentile range 99%-102%, which means that they suffer from overweight as is the case with boys, there were no significant differences between boys and girls with regard to BMI, as all of them suffer from obesity [Table 2, 4].

For local reference comparisons, overweight was defined as weight equal to or greater than 90% for gender and age, and obesity as weight equal to or greater than 97% for gender and age. A weight figure greater than the 10% and less than the 90% for sex and age was considered to be a normal weight according to the world health organization -WHO and Centers for Disease Control and Prevention – CDC standards. Briefly the Category and BMI range (kg/m^2) are Underweight <5%; Healthy weight 5% - 85%; at risk of overweight 85% - 95% and Overweight >95% [8, 9].

Table 1: Obese children's gender distribution

Gender	Number (%)
Girls	44 (55)
Boys	36 (45)
Total (%)	80 (100)

Table 2: Obese children's age distribution

Age (years)	Boys (%)	Girls (%)	Total (%)
6	6 (16.66)	10 (22.72%)	16 (20%)
7	12 (33.33)	12 (27.27%)	24 (30%)
8	14 (38.88)	10 (22.72%)	24 (30%)
9	4 (11.11)	12 (27.27%)	16 (20%)
Total	36 (100%)	44 (100%)	80 (100%)

Table 3: The relationship between gender (Boys) and BMI

Age (years)	Boys no. (%)	High (cm)	Weight (Kg)	BMI (Kg\M²)	Percentile range	category
6	6 (16.66)	116 – 117	24.8 – 25	18.3 – 18.4	94 – 95%	At risk of overweight
7	12 (33.33)	120 – 121	25.2 – 26	17.5 – 17.8	86 – 88%	At risk of overweight
8	14 (38.88)	124 - 125	32 – 33	20.8 – 21.1	96 – 97%	overweight
9	4 (11.11)	126 - 128	34 - 35	21.4	96%	overweight
Total (%)	36 (100)					

Table 4: The relationship between gender (Girls) and BMI

Age (years)	Girls no. (%)	High (cm)	Weight (Kg)	BMI (Kg\M²)	Percentile range	category
6	10 (22.72)	116 – 117	24 – 25	17.8 – 18.3	92 – 93%	At risk of overweight
7	12 (27.27)	120 – 121	26 – 28	18.1 – 19.1	88 – 93%	At risk of overweight
8	10 (22.72)	124 - 125	32 – 34	20.8 – 21.8	97 – 99%	overweight
9	12 (27.27)	126 - 128	35 - 38	22 – 23.2	99 - 102%	overweight
Total (%)	44 (100)					

White blood cell counts were normal in 64 (80%) of the children; 28 (43.75%) boys and 36 (56.25%) girls. While their number increased in 14 (17.5%) children; 8 (57.14%) boys and 6 (42.85%) girls. Only two boys (2.5%) had lower-than-normal cell counts. The PCV value was normal in 46 (57.5%) children, 20 (43.47%) boys and 26 (56.52%) girls. While the value was high in 4 (5%) children, 2 (50%) boys and 2 (50%) girls, which indicates that they have blood viscosity. The study also showed that 30 (37.5%) children had a PCV value lower than the normal range, which means that the children may suffer from anemia. The platelet count was normal in 28 (35%) of the children, 12 (42.85%) of the boys and 16 (57.14%) of the girls. Whereas the results of the current study showed that 52 (65%) children had lower platelet counts than normal; 26 (50%) boys and 26 (50%) girls, which means that children may be exposed to the risk of bleeding after any injury due to the low number of blood platelets in addition to their diabetes [Table 5]. Only two girls (2.5%) of the total children had normal triglycerides value, while 78 (97.5%) children had very high triglycerides value; 38 (48.31%) boys and 40 (51.28%) girls, which means that children may be exposed to the risk of heart and liver diseases, arthritis and heart attack .The values of LDL cholesterol and HDL cholesterol were high in 16 (20%) children and 66 (82.5%) children, respectively, and this may be a serious indication of the possibility of children of both sexes being exposed to the risk of overweight, heart disease and stroke [Table 6].

Many Iraqi studies indicate that children have increased in weight during the last five years and excessively; most of their results were in agreement with the results of the current study. Overweight and obesity were studied in 1798 students (910 males and 888 females) aged 11-14 years in the region of Baladrouz City in Iraq for one month (December 2017). The proportions of overweight and obesity among males were 26.9%, 17.4% for first, and second stages, respectively, while females were 47.9%, 33.3%, respectively [10]. Another research in Baghdad found that 30.3% of people had a high BMI, with 16.3% being overweight and 14% being obese. Obesity was caused by a lack of exercise, inactivity in

children, eating high-calorie meals, having a favorable family history of obesity, and consuming sweets and carbonated drinks [6]. From March to May 2009, 323 (46.4 % boys, 53.6 % girls) primary school kids aged 9-11 years were discovered to have obesity, 38.9% of them had high blood pressure, and all students had not been diagnosed with high blood pressure and had not received any drugs or therapy [11]. The results of other researchers showed that the BMI of 44 obese individuals was ≥30. In 57% obese patients, there was a highly significant rise in cholesterol, triglycerides, and VLDL concentrations. In obese females, there was a significant connection between BMI and LDL ($p<0.05$), but in obese males, there was a significant correlation between BMI and HDL ($p<0.01$) and a significant association between BMI and each VLDL and triglycerides ($p<0.05$) [12].

Table 5: Blood tests in obese children

Blood parameters	Total WBC n =80						PCV n =80						Platelets n =80					
	normal		high		low		normal		high		low		normal		high		low	
Groups	B (%)	G (%)	B (%)	G (%)	B (%)	G (%)	B (%)	G (%)	B (%)	G (%)	B (%)	G (%)	B (%)	G (%)	B (%)	G (%)	B (%)	G (%)
	28 (43.75)	36 (66.25)	8 (57.14)	6 (42.85)	2 (100)	0 (0)	20 (43.47)	26 (56.52)	2 (50)	2 (50)	16 (53.33)	14 (46.66)	12 (42.85)	16 (57.14)	0 (0)	0 (0)	26 (50)	26 (50)
Total	64 (100)		14 (100)		2 (100)		46 (100)		4 (100)		30 (100)		28 (100)		0 (0)		52 (100)	
Probability	0.213 NS						0.698 NS						0.542 NS					

Table 6: Lipid profiles tests in obese children

Lipid profile	Triglycerides n= 80				L.D.L n =80				H.D.L n = 80			
	Normal		High		Normal		High		Normal		High	
Groups	B %)(	G (%)	B %)(	G (%)	B %)(	G (%)	B %)(	G (%)	B %)(	G (%)	B %)(	G (%)
	0 (0)	2 (100)	38 (48.31)	40 (51.28)	34 (53.12)	30 (46.87)	2 (12.5)	14 (87.5)	4 (28.57)	10 (71.42)	34 (51.51)	32 (48.48)
Total	2 (100)		78 (100)		64 (100)		16 (100)		14 (100)		66 (100)	
Probability	0.173 NS				0.003				0.118 NS			

B: boys; G: girls

In the present study, it was found that all of the children consumed more than 5 meals per day, each of which contained a high percentage of fats and sugars, as well as being inactive and sedentary, spending the majority of their time playing electronic games; these findings were consistent with those of other local and international studies. The results of the study by Oday *et al.*, 2020 [13] showed that 48% of children aged 6 to 12 years consumed a lot of sweets, 48.5% exercised regularly, and 48.7% watched TV or used their mobile phone for more than two hours each day. Also, Barbu *et al.*, 2015 [14] revealed that the proportion of people who are overweight significantly was higher among boys than

girls in Bucharest's schools; it was 36.2%; 27.6%, respectively, as well as between the age group 6-10 years and 11-17 years (40.7%; 26.6%) respectively. Ninety five percent of the students had poor eating habits, however there was no link between this and being overweight. According to another study, in the Iraqi city of Basra, the incidence of overweight/obesity among primary school students was 24.1% (13.6 percent of the population is overweight, and 10.5 percent is obese), almost evenly distributed among males and females, and was directly proportional to their families' socioeconomic status [15].

According to a study in the Iraqi city of Dohuk, the prevalence of overweight (BMI ≥ 85% for age) and obesity (BMI greater than 95% for age) were 8.3% and 7.9%, respectively. It was also found that there was a significant correlation between obesity/overweight status and other important factors, which are the number of main and light meals during 24 hours, consumption of fast-cooked fried foods, fatty dairy products, soft drinks, sweets and red meat, child's decreased physical activity and the parents' weight gain [16]. Other research revealed that the average BMI for women was 51.5% and 13.3% for men, respectively. Positive associations between BMI, age, and a family history of obesity were also discovered [17].

Conclusion: According to this study, obesity and overweight have several causes. According to the study, sedentary activity and the consumption of unhealthy foods are all risk factors. Obesity and diabetes may result as a result of this.

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